

SECURITY

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REF: TELECON [] 30 SEPTEMBER 1970

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1. FOLLOWING IS A PROCEDURE TO CONVERT YAW VALUES IN A GEOCENTRIC INERTIAL SYSTEM (AS REPORTED IN THE [] DATA) TO YAW VALUES IN A LOCAL VERTICAL SYSTEM RELATIVE TO THE GROUND TRACK VELOCITY VECTOR AS DISCUSSED IN REF.

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2. THE MATHEMATICAL TECHNIQUES FOR THIS TRANSFORMATION CONSIST OF AN ORTHOGONAL ROTATION OF THE GEOCENTRIC INERTIAL SYSTEM INTO THE LOCAL VERTICAL SYSTEM. THE ANGLE OF ROTATION IS COMPUTED AS FOLLOWS:

LET: V EQUAL INERTIAL VELOCITY (FPS)

GAMMA EQUAL FLIGHT PATH ANGLE

AZ EQUAL INERTIAL AZIMUTH

THETA EQUAL NADIR LATITUDE

H EQUAL ALTITUDE (FEET)

R EQUAL RADIUS OF EARTH (20,855,000 FT.)

OMEGA EQUAL 0.7292115E-05 (EARTH'S ROTATION RATE IN RADIANS/SEC) (NOTE EXPONENTIAL NOTATION)

THEN: VP EQUALS V COS(GAMMA) R/CR PLUS H)

VGX EQUALS VP SIN (AZ)-R OMEGA COS(THETA)

VGY EQUALS VP COS (AZ)

FINALLY:

A EQUALS ARCTAN (VGX/VGY)-AZ (WHERE THE ARCTAN FUNCTION YIELDS VALUES FROM 0 TO 2 PI)

3. AFTER DETERMINING ANGLE A, THE APPLICATION OF THIS ORTHOGONAL ROTATION RESULTS IN A CHANGE TO YAW ONLY. PITCH AND ROLL ARE NOT AFFECTED. THUS, YAW EQUALS GEOCENTRIC YAW PLUS A.

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